REMARKS

This Response, filed in reply to the Office Action dated July 27, 2007, is believed to be fully responsive to each point of objection and rejection raised therein. Accordingly, favorable reconsideration on the merits is respectfully requested.

Claims 1-9 are all the claims pending in the application, of which Claims 7-9 have been withdrawn from consideration as being directed to nonelected inventions. Claims 1-6 are rejected. Claim 1 is objected to. Claims 7-9 are canceled. Claims 1-6 are currently amended. No new matter has been introduced by way of these claim amendments, and entry of this amendment is respectfully requested. Support for these amendments can be found throughout the originally filed specification, and at least on page 1, line 23 to page 2, line 3 and in the examples provided. Upon entry of these amendments, Claims 1-6 will be all the claims pending in the application.

Claim Objections

On page 2 of the Office Action, Claim 1 is objected to because recitation of "wherein ethylenically unsaturated compounds" allegedly has no support. The Office Action suggests that amending Claim 1 to recite "wherein the monomers" may overcome the objection.

Initially, Applicants respectfully submit that ample support for the subject term can be found on at least page 21 of the originally filed specification, wherein it is disclosed that "[t]he ethylenically unsaturated compounds other than the fluoroolefins are not particularly limited." However, to further clarify Applicants' claimed invention, Applicants hereby voluntarily amend Claim 1 so as to recite "wherein monomers comprising at least one fluoroolefin are

copolymerized in the presence of a compound having the formula ..." Applicants respectfully submit that the amendment to Claim 1 overcomes the objection.

Withdrawal of the objection is therefore respectfully requested.

Claim Rejections - 35 U.S.C. § 112

On page 3 of the Office Action, Claim 5 is rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite.

The Office Action asserts that recitation of "the fluoroolefin contains a compound selected from the group consisting of ... and a [functionalized] compound having the following formula" renders Claim 5 indefinite. The Office Action asserts that Claim 5 does not clearly specify whether the functionalized compound is necessary, or only optional.

Solely to advance prosecution, Applicants hereby voluntarily amend Claim 5 to even further clarify Applicants' claimed invention. Applicants respectfully submit that the amendments to Claim 5 overcome the rejection.

Accordingly, withdrawal of the rejection is respectfully requested.

Features of the Present Invention

1. The present invention is characterized in that copolymerization is carried out under conditions of a reduced temperature of at least 0.95 and a reduced pressure of at least 0.80, calculated using the Peng-Robinson formula.

2. In general, iodine- and fluorine-containing elastomers having highly active iodine atoms at the molecular ends are known as fluorine-containing elastomers exhibiting excellent chemical resistance, solvent resistance and heat resistance. The iodine atoms at the molecular

ends enable the iodine- and fluorine-containing elastomers to have good crosslinking efficiency, and thus the elastomers have excellent vulcanizablity. Furthermore, since there is no need to add a chemical substance containing a metal component, the elastomers have been widely used as peroxide vulcanization-molded articles (page 1, line 23 to page 2, line 3 of the present specification).

Iodine and fluorine-containing elastomers have been generally prepared by emulsion polymerization such as a so-called iodine transfer polymerization method. According to this method, in order to obtain a high terminal iodine content, however, it is necessary to restrain the amount of polymerization initiator, and accordingly productivity is lowered. In polymerization systems where an amount of a polymerization initiator is not limited, the polymerization rate can easily be increased by increasing the amount of the initiator, but in iodine transfer polymerization systems, there is a problem in that the initiator terminal content exerts a great influence on the physical properties of molded products (at page 2, line 24 to page 3, line 11).

3. The present invention aims to provide a fluorine-containing elastomer in which both productivity for the preparation of iodine- and fluorine-containing elastomers and properties thereof are satisfied.

4. The essential polymerization condition as to a polymerization pressure according to the present invention is explained herein below.

According to the calculation example described at page 14, lines 5 to 13 of the instant specification, the critical pressure when the composition inside the polymerization vessel is VdF/HFP = 36/64 (% by mol) is calculated using the Peng-Robinson formula using Aspen Plus Ver. 11.1, and is a critical pressure P_C = 3.05MPa. Further, when converted by the reduced pressure P_R = 0.80, the polymerization pressure P = at least 2.44MPa.

That is, in order to satisfy the pressure condition according to the present invention, a calculated pressure which is converted by the lower limit of reduced pressure 0.80 has to be lower than a practical polymerization pressure.

Claim Rejections - 35 U.S.C. § 102, or in the Alternative, 35 U.S.C. § 103(a)

On page 5 of the Office Action, Claims 1-6 are rejected under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Carlson (Japanese Patent No. 05-222130), Saito *et al.* (WO 00/47641) or Kitaichi *et al.* (U.S. Patent No. 6,509,429).

With regard to Claim 1, the Office Action alleges that Carlson, Saito *et al.* and Kitaichi *et al.* all disclose batchwise polymerization processes for making fluoropolymers using reduced temperature and reduced pressure, wherein copolymerization is achieved in the presence of an iodine-containing compound having the formula represented by $Rf^1(I)_x$. The Office Action alleges that upon conversion to the same pressure units as those recited in Claim 2, the reduced temperature, pressure and weight ratios of monomers disclosed in some working examples in the cited references overlap with, or are at least close to, the values for temperature and pressure calculated from the claimed Peng-Robinson formula in the instant claims.

With regard to Claim 2, the Office Action alleges that the pressures disclosed in the cited references overlap those of Claim 2.

Similar to the rejection of Claim 1, the Office Action asserts that the limitations of Claims 3 and 6 are inherent properties of the polymerization reactions disclosed in the cited references.

With regard to Claims 4 and 5, the Office Action asserts that the cited references disclose the use of fluorinated monomers such as VDF, HFP, TFE.

The Office Action acknowledges that neither Carlson, Saito *et al.* nor Kitaichi *et al.* disclose the use of the Peng-Robinson formula to derive the critical temperature and critical pressures. However, the Office Action asserts that since the batchwise polymerization conditions of the cited references use fundamentally the same iodine-containing compound and the same monomer mixture as instant Claim 1, a reasonable basis exists to believe that the polymerization reactions disclosed in the cited references *inherently* possess the same conditions as those derived from the Peng-Robinson formula.

With regard to the Carlson reference, the Office Action alleges that Carlson discloses batchwise polymerization using a reduced temperature of 25-150 °C and a reduced pressure of 8-80 atmospheres, which the Office Action alleges as being equivalent to 0.74-7.84 MPa. The Office Action also alleges that Carlson discloses the use of fluorinated monomers such as VDF, HFP and TFE and the use of various iodine-containing compounds that are encompassed by the claimed formula $Rf^1(I)_x$.

Applicants respectfully disagree with the rejection in view of the following remarks. Specifically, Applicants respectfully submit that the Office Action has not set forth a reasonable basis to conclude that the polymerization reactions of the cited references are encompassed by instant Claim 1. Specifically, in Examples 1 to 5 set forth by Carlson, although several processes for preparing fluorine-containing polymers are described, none of these example reactions anticipate the claimed invention in view of the foregoing.

For instance, in Example 1 described by Carlson, the polymerization pressure is disclosed as 2.66 MPa. However, in this example, the minimum polymerization pressure calculated

according to the limitations of instant Claim 1 (i.e. calculated from multiplying the critical pressure P_C by the reduced pressure P_R at the lower limit of 0.80 according to the Peng-Robinson formula, as described in detail on page 14, lines 5-13 of the instant specification) is 2.79 MPa. Accordingly, it is clear that in Example 1 of Carlson, the reduced pressure of the critical constant must be less than 0.80. Similarly, for Example 2, the polymerization pressure is disclosed as 2.07 MPa, however, the minimum polymerization pressure calculated according to the limitations of instant Claim 1 is 2.89 MPa. For Example 3, the polymerization pressure is disclosed as 2.62 MPa, however, the minimum polymerization pressure calculated according to the limitations of instant Claim 1 is 3.16 MPa. For Example 4, the polymerization pressure is disclosed as 2.62 MPa, however, in this example, the minimum polymerization pressure calculated according to the limitations of instant Claim 1 is 2.79 MPa. Lastly, for Example 5, the polymerization pressure is disclosed as 2.76 MPa, however, the minimum polymerization pressure calculated according to the limitations of instant Claim 1 is 3.29 MPa.

Polymerization pressures P, pressures calculated from multiplying critical pressures P_C by using the Peng-Robinson formula at the lower limit of reduced pressure P_R 0.80 of Examples 1 to 5 of Carlson are shown in the Table below.

Table

	Examples (Carlson)				
	1	2	3	4	5
P (MPa)	2.66	2.07	2.62	2.62	2.76
$P_C \times P_R$ (0.80) (MPa)	2.79	2.89	3.16	2.79	3.29

Thus, it is clear that the polymerization pressures that would be mandated by the limitations of Claim 1, calculated from the critical pressures using the Peng-Robinson formula

with a reduced pressure of 0.80 as the lower limit (as described on page 14, lines 5-13 of the instant specification), exceed those polymerization pressures disclosed in every example set forth by Carlson. Accordingly, Applicants respectfully submit that the examples set forth by Carlson demonstrate that the reduced pressures of the critical constant must be significantly less than 0.80. As Applicants' invention mandates that the reduced pressure of the critical constant is at least 0.80, Carlson does not meet the limitations of the instant claims, as is required to maintain a rejection under 35 U.S.C. § 102(b).

With regard to the Saito *et al.* reference, the Office Action alleges that Saito *et al.* disclose batchwise polymerization at a reduced temperature of 80°C and a reduced pressure of 30 kgf/cm^2, which the Office Action interprets to be equivalent to 2.94 MPa. The Office Action also alleges that Saito *et al.* disclose the use of fluorinated monomers such as VDF, HFP and TFE and the use of various iodine-containing compounds that are encompassed by the claimed formula $Rf^1(I)_x$.

Applicants respectfully submit that the amendments to Claim 1 overcome the rejection. Specifically, Applicants have amended Claim 1 to mandate that the polymerization reaction occurs in the presence of water and an emulsifier. Applicants respectfully submit that the polymerization method of the instant process is distinct from that of Saito *et al.*, in that the bulk polymerization method of Saito *et al.* is not performed in the presence of water and an emulsifier.

Further, Applicants respectfully submit that Saito *et al.* do not even contemplate the use of reduced temperatures and reduced pressures according to the claimed invention that would result in an improvement in yield and properties of the final product.

Accordingly, Saito *et al.* fail to teach each and every element of the claims, as is required to maintain a rejection under 35 U.S.C. § 102(b).

With regard to the Kitaichi *et al.* reference, the Office Action alleges that Kitaichi *et al.* disclose batchwise polymerization at a reduced temperature of 95 °C and a reduced pressure of 4.2 MPa. The Office Action also alleges that Kitaichi *et al.* disclose the use of fluorinated monomers such as VDF, HFP and TFE and the use of various iodine-containing compounds that are encompassed by the claimed formula $Rf^1(I)_x$.

In Example 1 described by Kitaichi *et al.*, the polymerization pressure is disclosed as 1.47 MPa. However, in this example, the minimum polymerization pressure calculated according to the limitations of instant Claim 1 (i.e. calculated from multiplying the critical pressure by the reduced pressure according to the Peng-Robinson formula, as described in detail on page 14, lines 5-13 of the instant specification) is 3.19 MPa. Accordingly, it is clear that in Example 1 of Kitaichi *et al.*, the reduced pressure calculated using the Peng-Robinson formula must be less than that the lower limit mandated by the instant claims, that is, 0.80. Accordingly, Kitaichi *et al.* do not teach a method wherein the copolymerization is conducted under conditions wherein the reduced pressure of the critical constant is at <u>least</u> 0.80. Accordingly, Kitaichi *et al.* fail to teach each and every element of the claims, as is required to maintain a rejection under 35 U.S.C. § 102(b).

Further, none of the cited references even contemplate performing the iodine transfer polymerization under conditions wherein the reduced pressure of the critical constant is at least 0.80, as calculated by the Peng-Robinson formula. In this regard, although the prior art discloses preparation of iodine and fluorine-containing elastomers by iodine transfer polymerization, using this method it is necessary to limit the concentration of polymerization initiator, thus reducing

yield. In contrast, using polymerization systems wherein the amount of polymerization initiator is not limited, the polymerization rate can be easily increased by increasing the amount of polymerization initiator. However, in the latter approach, the initiator terminal concentration can exert a considerably detrimental influence on the physical properties of the final molded products, as described on page 2, line 24 to page 3, line 11 of the originally filed specification.

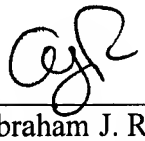
Applicants respectfully submit that there is no suggestion within the cited references, or within the art itself, that would lead one of ordinary skill in the art to realize the criticality of using reaction conditions wherein the reduced temperature of the critical constant is at least 0.95 and the reduced pressure of the critical constant is at least 0.80, to arrive at Applicants' claimed invention. Thus, Applicants respectfully submit that the instant claims are clearly not rendered obvious by the cited references.

Withdrawal of the rejection is therefore respectfully requested.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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Date: October 29, 2007